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the mandible was furnished with a palpus, which is not the case in the family *Idoteidœ* as usually understood. As figured and described, it seems to be a form combining characters distinctive of two primary groups of crustacea, and it is strange Prof. Cope should not have seen in it "the type of a peculiar group of high rank." On account of the interest this little animal must excite, it is to be regretted that it was not more fully described, but it is stated that, "the specimens are in bad condition, having lost their limbs, egg-pouches and the distal portions of their antennæ." This is perhaps the most important sentence in the description. The parasite of the blind fish, a Lernæan, described and figured with egg-sacks similar to those of the species just mentioned, is interesting, not only in itself, but for its possible relations to the *Cæcidotea.* Has not the damaged Isopod been carelessly restored with some of the Lernæan's appendages, instead of having retained them from some Entomostracan progenitor by retardation of development?—S. I. SMITH.

ANTHROPOLOGY.

ANTIQUITY OF MAN IN AMERICA.—In the December number of this journal we made an abstract of a paper printed by the Philadelphia Academy, in which Mr. Berthoud gave an account of the relics of an early race of men. As the geological position of the relics has been questioned, further information is very desirable.

MICROSCOPY.

A DRYING CASE.—Mr. Wm. H. Walmsley has been using for years, in the preparation of his well known microscopical objects, a very convenient and useful drying case. This case is especially useful for hardening balsam mountings, drying tissues, etc. It is made of tin, heated with hot water and well ventilated, capable of drying one hundred specimens at once, and able to retain its heat for eight hours without attention. Microscopists can obtain it from James W. Queen & Co.

AN OBJECT CARRIER.—The object carrier usually furnished with the concentric glass stages is extremely satisfactory for studying mounted specimens, but not equally good for other work. It is unsuitable for a large stage plate, or for a heavy trough or compressor unless moving too stiffly for ordinary use, and unavailable where objects are to be dissected and afterwards drawn with the camera or examined with high powers without risk of losing the object. Hence, for a working instrument, Prof. Biscoe prefers to discard the object carrier altogether and place the slide or other support directly on the stage. This is held in position, if the instrument should be tipped, by a brass sliding bar held by two cranked arms capable of being instantly made to move more or less stiffly by means of screws with milled heads. Should it be desired to place the instrument horizontally, for camera work or photography, an extra piece of brass clamps the object in place.

In Zentmayer's new form of students' microscope the glass sliding stage or object carrier is replaced by a glass sliding-bar, which simplifies the work and reduces the expense as well as secures some of the above advantages.

Some object carriers are arranged, and all should be, except in either mechanical stages or very cheap work, so that the sliding movement can be easily controlled by the pressure of milled-head screws.

NOBERT'S LINES. — Nobert has made for President Barnard a two hundred dollar test plate, twenty-band, which claims to reach 224,000 lines to the inch, being twice as fine as the finest lines on the nineteen-band plate. This puts him far ahead of the opticians, and he claims to be prepared to do still better when they overtake him. Who will make the first lens capable of resolving the twentieth-band? Or will those who believe they are able to resolve diatom-markings of equal fineness show it to us now?

RESOLVING-OBJECTIVES.—The editor of the "Cincinnati Medical News" draws very strongly, not too strongly, the distinction between resolving-objectives and those suitable for other work. He has a Powell & Lealand's one-sixteenth which he finds quite useless except for resolving diatoms. We mainly value, at present, the resolution of the famous tests as showing the achievement of a nicety of correction which can be, and should be, applied to the lower-angled working lenses.

MICROSCOPIC WRITING. — This hitherto rare curiosity is now available to all microscopists, both as an elegant toy and as a useful test for the optical qualities of their lenses. The following account, from a paper read before the Queckett Club, gives a view of Mr. Wm. Webb's unparalleled success in micro-writing on glass. The specimens thus produced are regarded by Mr. Webb as decidedly the best test-objects; and they may be obtained from Mr. Edmund Wheeler of London.

Mr. Webb says:—"I engrave a series of plates with letters measuring from one two hundred thousandth of an inch to one two hundred millionth of an inch. Each engraving is of the Lord's Prayer, varying only in size, commencing about the thousandth of an inch, which is at the rate of over a quarter of a million letters to the inch, and progressively decreasing the size, the next of the series being at the rate of a million letters to the inch, the next two millions, the next three, and the next four million letters to the inch. Having reached this point, and finding the Old and New Testament together consist of three million five hundred and sixty-six thousand four hundred and eighty letters (for the convenience of a standpoint), I say the lastly enumerated test is at the rate of one Bible to the inch and then engrave the next at the rate of another Bible to the inch, and go on decreasing at the rate of a Bible to the inch down to fifteen Bibles, or, at the rate of fifty-three million four hundred and ninety-seven thousand two hundred letters to the inch; but when it is remembered that the letters are written within two parallel lines, with spaces above and below for long letters, and to enable one line to be distinguishable from another, I most respectfully submit that, such letters as "a," "e," "o," and "u," although averaged, with all other letters, with the capitals, and including spaces, at the fifty-three million four hundred and ninety-seven thousand two hundredth of an inch, being actually written within the lines, after allowing for the extra space occupied by capitals, the spaces between words, and the space between one line of writing and the next line, it may be taken that the "e" actually occupies only one-fourth of the average, or, the two hundred and thirteen million nine hundred and eighty-eight thousand eight hundredth of an inch.

The measurement does not stop at this point, as there are other steps to be traversed—as to one, the dot to an "i," I say nothing now. As to the "e," it is self-evident that it is not a spot of black of the previously estimated less than two hundred millionth of an inch, but composed of a bent and twisted line across, and about the two hundred millionth of an inch; therefore, the thickness of the line has to be considered, and, taking that at a lineal fifth of the space, the two hundred and odd millionth would have to be multiplied by twenty-five as the square of five, which would bring the square of the line down to the five thousand three hundred and forty-nine million seven hundred and twenty thousandth of an inch—and do not stop there, for that five thousand millionth is itself loaded in, and consists of abraded black atoms, grated in by the cutting edge of the glass letter, which atoms can be seen in different aggregations where the line has not been perfectly filled in, and if at the rate of two atoms of black in the square of the line, the five thousand millionth becomes the ten thousand millionth; if at the rate of twenty atoms of black, the size of the atom is the one hundred thousand millionth of an inch.

I now come to the most important and, to my mind, the most interesting part of the subject, which deals with the tests unblackened. For this purpose I must go back to the square of the line forming the letter as the five billion three hundred and forty-nine million seven hundred and twenty thousandth of an inch that, reduced to its square root, gives seventy-three thousand plus of an inch linear as the breadth of the line.

I mount the same series of slides in the way that Monsieur Nobert mounts his justly celebrated tests — without black—and thus open up a wonderful means of study of the whole subject, helping to afford the power of determining at what breadth unblackened lines become invisible, even when aided by the microscopes of the present day. In this instance the seventy-three thousandth is an absolute line, unbroken by a next line.

When viewing the black lines, ordinary direct illumination is sufficient, but when examining the unblackened lines it becomes necessary to adopt in its turn every available means of illumination, because the cut, being wedge-shaped, each side of the cut, from every part to its very apex, both refracts and reflects again and again the light from the other. Again, the original upper and lower surfaces of the glass refract and reflect the light backwards and forwards; again, the top light flows into the cut, helping to produce the climax which blazes away the cut as the light of the sun overpowers or destroys the light of a candle.

By testing by blackened and by plain unblackened letters, it will be found at what point the power of certain objectives ceases to be effective with transparent objects. I can define the smallest Lord's Prayer when blackened, that is, I can define a line of the seventy-three thousandth of an inch, but have never been able to define the same test unblackened. More than that, although I know the exact spot that it occupies, and mark the spot with an Indian ink ring before it leaves the machine in which it is engraved, I have never (perhaps because of irritable temperament) been able to discover not merely the line, but the aggregation of lines forming the two hundred and twenty-seven letters of the very small tests, although they become perfectly distinct when black."

As a test of distortion, Mr. Webb rules fine black lines upon two pieces of glass, and places one upon the stage and the other upon the diaphragm in the ocular.

ANIMALCULES IN BUTTERMILK.—The "Pacific Medical Journal" believes, with much reason, that the abundance of animalcules discovered in poisonous buttermilk by Dr. J. P. Browne, of Galt, Ontario, were developed in the milk after it had been taken from the cow, instead of being introduced into the cow's system with the food and finding their way through the blood into the milk.

NOTES.

WHEN Professor Agassiz gave his opening lecture in the Museum of Comparative Zoology at Cambridge in .1860, he said that American students had been forced to visit Europe, if they were desirous of making any extended study in the natural sciences, but that he intended to reverse this and compel European students to visit America; and by his judicious purchase of type collections abroad (thanks to the liberality of citizens and our State) he has made his promise good.

Professor Henry A. Ward of Rochester, New York, formerly a student of Professor Agassiz, and since Professor of Geology and Zoology in the Rochester University, has, under humbler auspices, long been working toward the same end. His large cabinet of geology and mineralogy at Rochester is well known to many of our readers. He long ago felt the necessity of bringing before the American student examples of those larger and rarer fossils known to geological science, of which only single specimens existed.

For this purpose he visited Europe, engaged accomplished workmen and commenced the foundation of a collection of casts. With untiring patience and sagacity he secured the moulds of nearly everything of importance, at enormous expense, carrying his workmen from one museum to the other, and taking moulds of the choicest specimens, for a period of three years.

The difficulties encountered in some of his experiences would form an interesting chapter. After many difficulties, he managed to secure moulds of the rare Megatherium, Glyptodon, Deinotherium, Diprotodon, Sivatherium, Colossochelys, Mosasaurus, Plesiosaurus, and many other unique specimens in European museums. Thorough and methodical in all his work, he felt that this collection of casts should be symmetrical and complete, as an educational collection, and so was commenced the famous Ward collection of casts. Thousands of dollars were spent in buying especially choice specimens of the obtainable forms solely for the